

CLAIMS

WHAT IS CLAIMED:

1. A connector, comprising:

5 a first end adapted to be coupled to a first component;

a plurality of locking segments that, when actuated, are adapted to secure said first
component to a second component; and

a locking mandrel that, when actuated, is adapted to engage each of said plurality of
locking segments at at least three discrete, spaced apart engagement areas.

10 2. The connector of claim 1, wherein at least one of said engagement areas is a
substantially flat engagement area defined by the engagement of substantially flat surfaces.

15 3. The connector of claim 1, wherein all of said engagement areas are substan-
tially flat engagement areas defined by the engagement of substantially flat surfaces.

4. The connector of claim 1, wherein at least one of said engagement areas is a
tapered engagement area defined by the engagement of tapered surfaces.

20 5. The connector of claim 1, wherein all of said engagement areas are tapered
engagement areas defined by the engagement of tapered surfaces.

6. The connector of claim 1, wherein said first end is threadingly coupled to said
first component.

7. The connector of claim 1, wherein said first component is comprised of at least one of a blowout preventer, a riser, a production tree, a tubing head and a running tool.

8. The connector of claim 1, wherein said second component is comprised of at least one of a blowout preventer, a riser, a production tree, a tubing head and a running tool.

9. The connector of claim 1, further comprising at least one indicator rod that is operatively coupled to said locking mandrel and adapted to indicate a position of said locking mandrel.

10. The connector of claim 1, wherein each of said plurality of locking segments comprises:

a first primary locking shoulder that is adapted to engage a first surface on said first component; and

a second primary locking shoulder that is adapted to engage a second surface on said second component.

11. The connector of claim 10, wherein each of said plurality of locking segments further comprises:

a first secondary shoulder on said locking segment that is adapted to engage a first secondary shoulder on said first component; and

a second secondary shoulder on said locking segment that is adapted to engage a second secondary shoulder on said second component.

12. The connector of claim 10, wherein said first primary locking shoulder and said first surface on said first component are tapered surfaces.

13. The connector of claim 10, wherein said second primary locking shoulder and said second surface on said second component are tapered surfaces.

14. The connector of claim 1, wherein said locking mandrel comprises a plurality of recesses, each of which is adapted to receive a protrusion on said locking segments when said locking segments are in a disengaged position.

15. The connector of claim 1, wherein each of said locking segments is comprised of a downwardly facing surface that is adapted to engage an upwardly facing surface on said locking mandrel when said locking mandrel is actuated to disengage said connector.

16. The connector of claim 1, wherein said locking mandrel is operatively coupled to a primary piston.

17. The connector of claim 16, further comprising a secondary release piston positioned below said primary piston, said secondary release piston adapted to, when actuated, cause said primary piston to move.

18. A connector, comprising:

a first end adapted to be coupled to a first component;

a plurality of locking segments that, when actuated, are adapted to secure said first

component to a second component; and

a locking mandrel that, when actuated, is adapted to engage each of said plurality of locking segments at at least two discrete, spaced apart substantially flat engagement areas.

5 19. The connector of claim 18, wherein said connector is engaged at at least three discrete, spaced apart substantially flat engagement areas.

 20. The connector of claim 18, wherein said first end is threadingly coupled to said first component.

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 21. The connector of claim 18, wherein said first component is comprised of at least one of a blowout preventer, a riser, a production tree, a tubing head and a running tool.

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 22. The connector of claim 18, wherein said second component is comprised of at least one of a blowout preventer, a riser, a production tree, a tubing head and a running tool.

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 23. The connector of claim 18, further comprising at least one indicator rod that is operatively coupled to said locking mandrel and adapted to indicate a position of said locking mandrel.

 24. The connector of claim 18, wherein each of said plurality of locking segments comprises:

 a first primary locking shoulder that is adapted to engage a first surface on said first component; and

a second primary locking shoulder that is adapted to engage a second surface on said second component.

25. The connector of claim 24, wherein each of said plurality of locking segments further comprises:

a first secondary shoulder on said locking segment that is adapted to engage a first secondary shoulder on said first component; and

a second secondary shoulder on said locking segment that is adapted to engage a second secondary shoulder on said second component.

26. The connector of claim 24, wherein said first primary locking shoulder and said first surface on said first component are tapered surfaces.

27. The connector of claim 24, wherein said second primary locking shoulder and said second surface on said second component are tapered surfaces.

28. The connector of claim 18, wherein said locking mandrel comprises a plurality of recesses, each of which is adapted to receive a protrusion on said locking segments when said locking segments are in a disengaged position.

29. The connector of claim 18, wherein each of said locking segments is comprised of a downwardly facing surface that is adapted to engage an upwardly facing surface on said locking mandrel when said locking mandrel is actuated to disengage said connector.

30. The connector of claim 18, wherein said locking mandrel is operatively coupled to a primary piston.

31. The connector of claim 30, further comprising a secondary release piston positioned below said primary piston, said secondary release piston adapted to, when actuated, cause said primary piston to move.

32. A connector, comprising:

a first end adapted to be coupled to a first component;

a plurality of locking segments that, when actuated, are adapted to secure said first component to a second component; and

a locking mandrel that, when actuated, is adapted to engage each of said plurality of locking segments at three discrete, spaced apart, substantially flat engagement areas.

33. The connector of claim 32, wherein said first end is threadingly coupled to said first component.

34. The connector of claim 32, wherein said first component is comprised of at least one of a blowout preventer, a riser, a production tree, a tubing head and a running tool.

35. The connector of claim 32, wherein said second component is comprised of at least one of a blowout preventer, a riser, a production tree, a tubing head and a running tool.

36. The connector of claim 32, further comprising at least one connector rod that is operatively coupled to said locking mandrel and adapted to indicate a position of said locking mandrel.

5 37. The connector of claim 32, wherein each of said plurality of locking segments comprises:

a first primary locking shoulder that is adapted to engage a first surface on said first component; and

10 a second primary locking shoulder that is adapted to engage a second surface on said second component.

38. The connector of claim 37, wherein at least one of said substantially flat areas is axially positioned between said first and second primary shoulders and laterally offset therefrom.

15 39. The connector of claim 37, wherein each of said plurality of locking segments further comprises:

a first secondary shoulder on said locking segment that is adapted to engage a first secondary shoulder on said first component; and

20 a second secondary shoulder on said locking segment that is adapted to engage a second secondary shoulder on said second component.

40. The connector of claim 37, wherein said first primary locking shoulder and said first surface on said first component are tapered surfaces.

41. The connector of claim 37, wherein said second primary locking shoulder and said second surface on said second component are tapered surfaces.

42. The connector of claim 32, wherein said locking mandrel comprises a plurality of recesses, each of which is adapted to receive a protrusion on said locking segments when said locking segments are in a disengaged position.

43. The connector of claim 32, wherein each of said locking segments is comprised of a downwardly facing surface that is adapted to engage an upwardly facing surface on said locking mandrel when said locking mandrel is actuated to disengage said connector.

44. The connector of claim 32, wherein said locking mandrel is operatively coupled to a primary piston.

45. The connector of claim 44, further comprising a secondary release piston positioned below said primary piston, said secondary release piston adapted to, when actuated, cause said primary piston to move.

46. A connector, comprising:
a first end adapted to be coupled to a first component;
a plurality of locking segments that, when actuated, are adapted to secure said first component to a second component, wherein each of said plurality of locking segments comprises:

a first primary locking shoulder that is adapted to engage a first surface on said
first component, and

a second primary locking shoulder that is adapted to engage a second surface
on said second component; and

5 a locking mandrel that, when actuated, is adapted to engage each of said plurality of
locking segments at three discrete, spaced apart, substantially flat engagement
areas.

47. The connector of claim 46, wherein said first end is threadingly coupled to
10 said first component.

48. The connector of claim 46, wherein said first component is comprised of at
least one of a blowout preventer, a riser, a production tree, a tubing head and a running tool.

15 49. The connector of claim 46, wherein said second component is comprised of at
least one of a blowout preventer, a riser, a production tree, a tubing head and a running tool.

50. The connector of claim 46, further comprising at least one connector rod that
is operatively coupled to said locking mandrel and adapted to indicate a position of said
20 locking mandrel.

51. The connector of claim 46, wherein each of said plurality of locking segments
further comprises:

a first secondary shoulder on said locking segment that is adapted to engage a first
25 secondary shoulder on said first component; and

a second secondary shoulder on said locking segment that is adapted to engage a
second secondary shoulder on said second component.

52. The connector of claim 46, wherein said first primary locking shoulder and
5 said first surface on said first component are tapered surfaces.

53. The connector of claim 46, wherein said second primary locking shoulder and
said second surface on said second component are tapered surfaces.

10 54. The connector of claim 46, wherein said locking mandrel comprises a plurality
of recesses, each of which is adapted to receive a protrusion on said locking segments when
said locking segments are in a disengaged position.

15 55. The connector of claim 46, wherein each of said locking segments is
comprised of a downwardly facing surface that is adapted to engage an upwardly facing
surface on said locking mandrel when said locking mandrel is actuated to disengage said
connector.

20 56. The connector of claim 46, wherein said locking mandrel is operatively
coupled to a primary piston.

57. A connector, comprising:
a first end adapted to be coupled to a first component;
a plurality of means for securing said first component to a second component; and

means for engaging each of said means for securing said first component to said second component at at least three discrete, spaced apart engagement areas.

58. The connector of claim 57, wherein said plurality of means for securing said first component to said second component comprises a plurality of locking segments, each of which are adapted to, when actuated, engage said first and second components.

59. The connector of claim 57, wherein said means for engaging each of said means for securing said first component to said second component comprises a locking mandrel.

60. The connector of claim 57, further comprising a means for actuating said means for engaging each of said plurality of securing means.

61. The connector of claim 60, wherein said means for actuating said means for engaging comprises a piston operatively coupled to said means for engaging.

62. The connector of claim 57, further comprising a secondary release means for disengaging said means for engaging each of the means for securing said first component to said second component.

63. The connector of claim 62, wherein said secondary release means comprises a piston.

64. The connector of claim 57, wherein at least one of said engagement areas is a substantially flat engagement area defined by the engagement of substantially flat surfaces.

65. The connector of claim 57, wherein all of said engagement areas are substantially flat engagement areas defined by the engagement of substantially flat surfaces.

66. The connector of claim 57, wherein at least one of said engagement areas is a tapered engagement area defined by the engagement of tapered surfaces.

67. The connector of claim 57, wherein all of said engagement areas are tapered engagement areas defined by the engagement of tapered surfaces.

68. The connector of claim 57, wherein said first component is comprised of at least one of a blowout preventer, a riser, a production tree, a tubing head and a running tool.

69. The connector of claim 57, wherein said second component is comprised of at least one of a blowout preventer, a riser, a production tree, a tubing head and a running tool.